PRELIMINARY DRAFT (as of June 13, 2003)
TECHNICAL MEMORANDUM
Revision 1

REMEDIAL ACTION OBJECTIVES
MIDNITE MINE SUPERFUND SITE
WELLPINIT, WASHINGTON

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ABBREVIATIONS AND ACRONYMS

AEA	Atomic Energy Act
AMD	acid mine drainage
ANPR	Advance Notice of Proposed Rulemaking
AOC	Area of Concern/Contamination
ARAR	applicable or relevant and appropriate requirement
BLM	Bureau of Land Management
BMP	Best Management Practices
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
COC	contaminant of concern
COPC	contaminant of potential concern
CSM	conceptual site model
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
ERA	ecological risk assessment
FS	feasibility study
HHRA	human health risk assessment
LDR	Land Disposal Restrictions
MA	Mined Area
MBTA	Migratory Bird Treaty Act
MCL	maximum contaminant level
mg/kg	milligram per kilogram
MTR	minimum technology requirements
NAGPRA	Native American Graves Protection and Repatriation Act
NCP	National Oil and Hazardous Substances Contingency Plan
NESHAPs	National Emissions Standards for Hazardous Air Pollutants
NHPA	National Historic Preservation Act
NPDES	National Pollutant Discharge Elimination System
NTU	nephelometric turbidity unit
pCi/g	picocuries per gram
PCP	Pollution Control Pond
PIA	Potentially Impacted Area
PRG	preliminary remediation goal
Ra	radium
RAO	remedial action objective
RBC	risk-based concentration
RCRA	Resource Conservation and Recovery Act
RI	remedial investigation
ROD	Record of Decision

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ABBREVIATIONS AND ACRONYMS (Continued)

SDWA	Safe Drinking Water Act
SMI	Shepherd Miller Inc.
SQG	sediment quality guideline
TBC	To Be Considered
TEC	threshold effects concentration
Th	thorium
THPO	Tribal Historic Preservation Office
TSD	treatment, storage, or disposal
U	uranium
UCL_{95}	95 percent upper confidence limit
ug/L	micrograms per liter
UMTRCA	Uranium Mill Tailings Radiation Control Act
URS	URS Group Inc. (formerly URS Greiner)

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1.0 INTRODUCTION

This draft technical memorandum for the Midnite Mine feasibility study (FS) provides preliminary and early identification of expected applicable or relevant and appropriate requirements (ARARs) and remedial action objectives (RAOs). This draft technical memorandum was written concurrently with the remedial investigation (RI), the human health risk assessment (HHRA), and the ecological risk assessment (ERA). Therefore, information presented in this memorandum will be refined and updated, as necessary, as the nature and extent of contamination is identified and the risk assessments are completed. Further, some information that is developed using the results of the RI and risk assessments is not available for inclusion in this technical memorandum, including exposure pathways and media concentrations that pose unacceptable risk. After further development, including feedback from reviewers, this technical memorandum will be revised and reissued as Section 2 of the draft FS.

1.1 PURPOSE

The purpose of this draft technical memorandum is to provide an opportunity for stakeholders to understand the evolving FS and provide timely input to its further development. This memorandum represents a preliminary stage of ongoing FS development.

The primary focus of this technical memorandum is to identify preliminary ARARs and RAOs for the Mined Area (MA) and other mining-affected areas and media within the Midnite Mine site (Site). A site location map, included as Figure 1-1, identifies the MA, drainages, roads, and other site features. Preliminary RAOs are established prior to development of remedial alternatives during the FS (EPA 1988). RAOs specify the contaminants and media of concern, potential exposure pathways and receptors, and preliminary remediation goals (PRGs) that allow a range of treatment and containment-based remedial alternatives to be developed.

1.2 ORGANIZATION

This technical memorandum is organized in seven sections.

- Section 1 provides a brief introduction.
- Section 2 presents the potential areas and media of concern.
- Section 3 briefly summarizes preliminary chemicals and radionuclides of potential concern (COPCs) for the human health and ecological risk assessments.
- Section 4 identifies preliminary ARARs.

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- Section 5 discusses the preliminary RAOs for each medium.
- Section 6 describes criteria for developing PRGs
- Section 7 provides references

Figure 1-1 Site Location Map

11 x 17, must start on odd numbered page (2 pages)

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Figure 1-1 (Page 2)

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2.0 POTENTIAL AREAS AND MEDIA OF CONCERN

The Midnite Mine site consists of the Mined Area (MA) and other mining-affected areas and media. This section describes the major features of the site, areas of concern, and media of concern.

2.1 MAJOR FEATURES OF THE SITE

The MA is defined as the 343 acres where the surface has been disturbed by historical mining operations conducted between 1955 and 1981 (SMI 1996)[1]. The surface elevations of the MA range from 2,400 to 3,570 feet above sea level (SMI 1996). The major features of the MA are shown in Figure 2-1 and include:

- Two open pits, Pit 3 and Pit 4, that are partially filled with water
- Areas of mine spoils and waste rock
- Ore and protore stockpiles
- Former open pits that have been backfilled with waste materials
- Other surface water, including surface impoundments, seeps, and ditches
- A water treatment facility and associated seep collection sumps and weirs
- Miscellaneous buildings, including former maintenance shop buildings and mine offices
- Access and haul roads

Areas surrounding the MA that potentially have been affected by historical mining activities include drainages that receive runoff from the MA, downwind areas, and haul roads. These areas are collectively referred to as the Potentially Impacted Area (PIA). In the RI, concentrations of contaminants in these areas will be compared to concentrations at background locations to estimate the extent of mining-related effects.

Ongoing transport of contaminants from the MA to the surrounding areas occurs primarily in water, including groundwater, seeps, and surface water. Most surface water flow from the MA is conveyed through the Western, Central, and Eastern Drainages. These drainages converge into

[1] This area does not include a potentially disturbed area encompassing approximately 7 acres, which is located north of the shop and office buildings and included within the MA boundary shown in Figures 1-1 and 2-1.

Blue Creek, and the water ultimately flows into Lake Roosevelt. Other drainages east and west of the site drain small areas of the MA. Water collection and pump back systems contain a major portion of the seep water; however, portions of the seep water escape down the drainages, particularly during high flow conditions. Water treatment, consisting of chemical precipitation, is used to reduce the concentrations of metals and radium in the collected seep water. The effluent from the water treatment facility is discharged to the Eastern Drainage and ultimately flows into Blue Creek and Lake Roosevelt.

2.2 MINE-AFFECTED AREAS

A preliminary identification of mine-affected areas is presented in the draft technical memorandum "Selection of Contaminants of Potential Concern for the Human Health Risk Assessment Workplan" (U.S. EPA 2002), which contains the following conclusions. In the MA, affected areas include surface and subsurface materials, groundwater, and sediment and water in the open pits (Pits 3 and 4). In the PIA, the affected areas include surface and subsurface material on and adjacent to the gravel haul roads, groundwater, and sediment and surface water in the East, Central, Western, and (based on limited sampling) Far Western Drainages. In Blue Creek, surface water is affected in both the Middle and Lower segments[2], while in Middle Blue Creek sediments are affected. Soils downwind of the MA, Lake Roosevelt sediments, and peripheral mine drainages are not considered mine-affected.

2.3 MEDIA OF CONCERN

Media of concern were identified in the draft technical memorandum "Selection of Contaminants of Potential Concern for the Human Health Risk Assessment Workplan" (U.S. EPA 2002) and include four primary and three secondary exposure media. The primary exposure media are:

- Surface and subsurface material including ore, protore, waste rock, haul road material, and soil
- Sediments in surface water bodies such as pits, ponds, and drainages
- Surface water (including seeps) in surface water bodies including pits, ponds, and drainages

[2] Middle Blue Creek is the reach from the confluence of the Eastern Drainage and Blue Creek to the confluence of Oyachen Creek and Blue Creek. Lower Blue Creek is the reach from the confluence of Oyachen Creek and Blue Creek to Lake Roosevelt.

- Groundwater
- Air (radon only, fugitive dust inhalation is not considered a significant exposure pathway)

The secondary exposure media are:

- Plants
- Livestock and wildlife

Figure 2-1 Mined Area Features

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Figure 2-1 (page 2)

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3.0 PRELIMINARY CONTAMINANTS OF POTENTIAL CONCERN

Contaminants of potential concern (COPCs), which include chemicals and radionuclides in the MA and other mining-impacted areas, are shown in Table 3-1 for the HHRA and in Table 3-2 for the ERA. COPCs are the contaminants carried forward for evaluation in the risk assessment. A comprehensive list of COPCs for human health by media and area is presented in the draft technical memorandum "Selection of Contaminants of Potential Concern for the Human Health Risk Assessment Workplan" (EPA 2002) and updated COPC screening tables (EPA 2003). The ERA is under development; therefore, the list of ecological COPCs presented in Table 3-2 is preliminary and subject to change.

Essential ecological nutrients and major anions and cations will not be evaluated in the ERA, with the exception that toxicity associated with sulfate will be evaluated. These constituents also will not be considered in the HHRA because they are not associated with toxicity under normal circumstances and/or toxicity information is not available from EPA. EPA guidance states that essential human nutrients such as iron, magnesium, calcium, potassium, and sodium need not be considered in the quantitative risk assessment if they are unlikely to be associated with toxicity at levels encountered at the site (EPA 1998a). For many, quantitative toxicity information is not available from EPA (EPA 1998b). Although a toxicity value exists for iron, the value is based on the upper range of intake rates and is not associated with adverse health effects. Accordingly, iron, magnesium, calcium, potassium, and sodium will not be considered COPCs for quantitative evaluation in the HHRA.

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Table 3-1
Contaminants of Potential Concern, Human Health Risk Assessment

Chemicals
Aluminum
Antimony
Arsenic
Beryllium
Cadmium
Chromium
Cobalt
Copper
Lead
Manganese
Nickel
Selenium
Silver
Thallium
Uranium (total)
Vanadium
Zinc
Radionuclides
Gross alpha particles
External gamma radiation
Lead 210 and decay products
Radium 226 and decay products
Radon 222
Thorium 228
Uranium 234
Uranium 238 and decay products

Note: Not all COPCs will be evaluated for all media and areas. A comprehensive list of COPCs by media and area is presented in the preliminary COPC technical memorandum (EPA 2002) and updated COPC screening tables (EPA 2003).

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Table 3-2
Preliminary Contaminants of Potential Concern, Ecological Risk Assessment

Chemicals
Aluminum
Antimony
Arsenic
Barium
Beryllium
Cadmium
Chromium
Cobalt
Copper
Iron
Lead
Manganese
Mercury
Molybdenum
Nickel
Selenium
Silver
Thallium
Uranium (total)
Vanadium
Zinc
Radionuclides
Uranium 235 and decay products
Uranium 238 and decay products
Thorium 232 and decay products

Note: The ecological risk assessment is under development; therefore, this list of contaminants is subject to change.

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4.0 IDENTIFICATION OF POTENTIAL APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARs)

4.1 INTRODUCTION

This section provides a preliminary identification of potential applicable or relevant and appropriate requirements (ARARs) and to-be-considered (TBC) materials for the Midnite Mine Site. The section defines ARARs and TBCs, and discusses potential ARARs and TBCs by environmental medium and subject area headings (for example, surface water quality, waste management, and Native American concerns and cultural resources protection).

4.1.1 Definition of ARARs

As defined in the National Oil and Hazardous Substances Contingency Plan (NCP) (40 CFR Part 300), "applicable" requirements are those cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under federal or state law that specifically address a hazardous substance, remedial action, location, or other circumstance at a site.

"Relevant and appropriate" requirements are those cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under federal environmental or state environmental or facility siting law that, while not *applicable* to a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site, address problems or situations sufficiently similar to those encountered at the site that their use is well suited to the site.

CERCLA Section 126 directs EPA to afford Indian tribes substantially the same treatment as states for certain specified subsections of CERCLA Sections 103, 104, and 105. In the preamble to the NCP (55 *Federal Register* 8741, March 8, 1990), EPA states that it believes, as a matter of policy, that it is similarly appropriate to treat Indian tribes as states for the purpose of identifying ARARs under CERCLA Section 121(d)(2).

That is, under CERCLA, tribal requirements are treated consistently with state requirements, provided they meet the CERCLA eligibility criteria for state ARARs (i.e., the requirements are promulgated [legally enforceable and of general applicability], are more stringent than federal requirements, and are identified in a timely manner). Tribal requirements within the Reservation boundaries are potentially applicable to remedial activities, but State requirements are not applicable. The determination of whether any Washington State statutes or regulations are potentially relevant and appropriate will be made by EPA. Therefore, no Washington state statutes or regulations are addressed in this memorandum.

ARARs are potential or preliminary until finalized by EPA in a Record of Decision (ROD) for a site. The NCP [40 CFR 300.415(f)(1)(ii)(C)] provides for the waiver of ARARs under certain circumstances. Because this is a preliminary evaluation of potential ARARs, with remedial alternatives still being developed, any identification of the need for ARAR waivers is premature at this time. EPA is consulting with the Tribe on identification of ARARs.

4.1.2 Definition of To Be Considered (TBC) Materials

In addition to ARARs, many federal, state, and tribal environmental and public health programs also have criteria, advisories, guidance, and proposed standards that are not legally binding but that may provide useful remediation information or recommended procedures. These materials are evaluated, along with ARARs, to establish protective cleanup levels and to help identify remedial action alternatives. If no ARARs address a particular chemical or situation, or if existing ARARs do not provide adequate information, these advisories, criteria, or guidelines are "to be considered" (TBC) materials available for use in developing CERCLA remedies.

4.2 POTENTIAL ARARS

Potential ARARs for Midnite Mine are discussed in this subsection under the following categories:

- Surface Water Quality
- Groundwater Quality
- Air Quality
- Soil Quality
- Waste Management
- Native American Concerns and Cultural Resources Protection
- Special Status Species
- Sensitive Environments

4.2.1 Surface Water Quality

Clean Water Act Section 304—Federal Ambient Water Quality (*National Recommended Water Quality Criteria*, November 2002, and 67 *Federal Register* 79091-79095, December 27, 2002). Section 304(a)(1) of the Clean Water Act requires EPA to develop, publish, and revise criteria for water quality accurately reflecting the latest scientific knowledge. CERCLA Section 121(d)(2)(B)(i) provides that, "In determining whether or not any water quality criteria under the Clean Water Act are relevant and appropriate under the circumstances of the release or threatened release, the President shall consider the designated or potential use of the surface or groundwater, the environmental media affected, the purposes for which such criteria were developed, and the latest information available."

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Therefore these surface water quality criteria are *potentially relevant and appropriate* to both ambient surface water quality and point source discharges that occur as part of remedial actions. Ambient water quality criteria for nonradiological constituents of potential concern at Midnite Mine are provided in Table 4-1 for protection of human health and freshwater aquatic life. For metals that are hardness dependent, the values shown in the table are calculated based on a hardness of 100 mg/L calcium carbonate ($CaCl_3$). The actual ARAR for these metals is the equation to derive the value rather than the numeric value in the table, which is based on a standard assumption of water hardness.

Spokane Tribe of Indians Surface Water Quality Standards Resolution 2003-259, March 7, 2003. This resolution establishes surface water quality standards for protection of human health and aquatic life for surface waters on tribal lands. The standards were approved by EPA on April 22, 2003 and are *potentially applicable* to remedial actions at the site when the standards are more stringent than federal ambient water quality criteria.

Table 4-1 provides the Spokane Tribe's water quality standards for nonradiological constituents for protection of freshwater aquatic life and for human health (due to risks from ingestion of water or ingestion of water and organisms). Note that some of these standards are based on an assumed hardness value as well, so the potential ARAR is the equation itself. Table 4-2 provides the Tribe's water quality standards for radiological constituents.

Table 4-3 provides radiological and nonradiological standards for protection of human health from direct contact with surface water as a result of spiritual or ceremonial uses. The water quality standards define "primary contact ceremonial and spiritual" water use as activities involving Native American religious, spiritual and cultural practices that may involve primary or secondary contact with water, and immersion and intentional or incidental ingestion of water or steam.

National Pollutant Discharge Elimination System (NPDES) (40 CFR Part 122) regulations. The NPDES program requires that permits be obtained for point-source discharges of pollutants to surface water. The wastewater treatment plant currently operating on site has an NPDES permit from EPA, under its Clean Water Act authority rather than under CERCLA authority. Although permits would not be required for on-site actions under CERCLA, the substantive requirements of the permit program are *potentially applicable* to remedial activities at the site. The primary substantive requirement is that a point source discharge to a surface water body cannot cause an exceedance of water quality standards in the receiving water body, outside an approved mixing zone.

The substantive requirements of the general stormwater permit program for stormwater discharges associated with industrial and construction activities (40 CFR 122.26) are also *potentially applicable* to remedial actions at Midnite Mine. "Industrial activities" include inactive mining facilities, hazardous waste treatment units, and RCRA Subtitle D landfills.

"Construction activities" include land clearing, grading, and excavation. Substantive requirements state that best management practices (BMPs) must be used, and appropriate monitoring performed, to ensure that storm water runoff does not cause an exceedance of water quality standards in a receiving surface water body.

4.2.2 Groundwater Quality

National Primary Drinking Water Regulations (40 CFR Part 141) promulgated under the Safe Drinking Water Act (SDWA). These regulations protect the quality of public drinking water supplies through regulation of chemical parameters and constituent concentrations as maximum contaminant levels (MCLs) and are *potentially relevant and appropriate* when groundwater is a current or potential source of drinking water. MCLs for the constituents of interest at the Site are provided in Table 4-4.

4.2.3 Air Quality

National Emission Standards for Hazardous Air Pollutants (NESHAPs) for Uranium Mill Tailings Disposal Sites (40 CFR Part 61, Subpart T). These standards, also found at 40 CFR Part 192, Subpart A, limit radon-222 flux emissions to ambient air from inactive uranium mill tailings piles to 20 picocuries per square meter per second. These standards are considered *potentially relevant and appropriate* to remedial actions at the site.

4.2.4 Soil Quality

Standards for the Control of Residual Radioactive Materials from Inactive Uranium Processing Sites, 40 CFR Part 192, Subpart B—Cleanup of Land and Buildings Contaminated with Residual Radioactive Materials. These standards were developed under the Uranium Mill Tailings Radiation Control Act (UMTRCA) to govern the stabilization, disposal, and control of uranium and thorium mill tailings. While they cannot be applicable because Midnite Mine is not a uranium processing site, portions of the regulations are *potentially relevant and appropriate* to remedial actions at the site.

The 40 CFR Part 192 Subpart B standards require that remedial actions at designated processing sites be conducted in such a manner as to provide assurance that residual radioactive materials are controlled as follows:

- Concentrations of radium-226 in land averaged over 100 square meters shall not exceed background by more than:
  - 5 pCi/g averaged over first 15 cm of soil below surface

- 15 pCi/g averaged over 15 cm thick layers of soil more than 15 cm below surface.

Note that 40 CFR Part 192 Subpart C provides under special circumstances for establishment of alternative site-specific standards that come as close as reasonably achievable to meeting the UMTRCA standards.

40 CFR Part 192 Subpart E states that the 5 pCi/g and 15 pCi/g standards are suitable for remediation of radium-228 at certain sites. When used in this way, the standards apply to the combined level of contamination of radium-226 and radium-228. The standards also apply to the combined level of contamination of thorium-230 and thorium-232, parent isotopes of radium-226 and radium-228.

4.2.5 Waste Management

Resource Conservation and Recovery Act Subtitle C regulations; *40 CFR Parts 261, 262, and 264*. When RCRA was amended in 1980, Congress exempted certain mining and mineral processing wastes ("Bevill wastes") from Subtitle C (hazardous waste management) requirements. In 40 CFR 261.4(b)(7), EPA defines exempted mining wastes as solid wastes that result from the "extraction, beneficiation, and processing of ores and minerals (including coal, phosphate rock, and *overburden from the mining of uranium ore*), except as provided in 40 CFR 266.112 [italics added]. The extraction and beneficiation wastes that may be located at Midnite Mine are the following:

- Waste rock—including wastes from overburden and mine development rock. Overburden wastes are usually disposed of in unlined piles; mine development rock is often used on site for road and other construction uses. It is also stored in unlined on-site piles or in underground openings.

- Mine water—includes all water that collects in surface or underground mines due to groundwater seepage or inflow from surface water or precipitation.

While not potentially applicable, elements of Subtitle C regulations are *potentially relevant and appropriate* to ensure the safe management of some solid wastes. Examples of these elements are selected portions of the requirements for design and operation of a hazardous waste landfill (40 CFR Part 264, Subpart N) and selected portions of the requirements for landfill closure and post-closure (40 CFR Part 264, Subpart G).

For the management of RCRA hazardous wastes that are not Bevill-exempt, applicability of Subtitle C provisions depend on whether the wastes are managed within the Area of Contamination (AOC) (55 *Federal Register* 8760, Mar. 8, 1990). The AOC policy as applied to CERCLA sites means that movement of continuous contamination of varying amounts and types

within the AOC does not constitute placement. That is, placement of waste does not occur when waste is consolidated within an AOC, when it is treated in situ, or when it is left in place. Therefore, consolidation of contiguous units or areas of contaminated soil can occur without triggering RCRA land disposal restrictions (LDRs) or minimum technology requirements (MTRs) (see March 13, 1996, EPA memorandum, "Use of the Area of Contamination Concept During RCRA Cleanups" and OSWER 9347.3-O5FS, "Determining When Land Disposal Restrictions (LDRs) Are Applicable to CERCLA Response Actions, July 1989).

RCRA Subtitle C also provides treatment standards for debris contaminated with hazardous waste ("hazardous debris") (40 CFR 268.45), although the lead agency may determine that such debris is no longer hazardous, consistent with 40 CFR 261.3(f)(2). These requirements will be applicable for debris contaminated with hazardous waste that will be managed outside an AOC. The particular provisions of Subtitle C that are potentially applicable or relevant and appropriate for discrete remedial actions will be identified through the remedial investigation and feasibility study process.

Remedial alternatives are still being developed for the Midnite Mine cleanup. If any of the alternatives include provisions for disposal of wastewater treatment sludge, for example, siting restrictions within RCRA Subtitle C would be *potentially relevant and appropriate.* 40 CFR 264.18 contain limitations on where on-site treatment, storage, or disposal (TSD) of hazardous waste may occur:

- Hazardous waste TSD facilities cannot be located in seismically active areas. Seismically active areas are defined as within 200 feet of a fault which has had displacement in Holocene time

- TSD facilities located in a 100-year floodplain must be designed, constructed, operated, and maintained to prevent washout by a 100-year flood event

- Hazardous wastes cannot be placed in certain geological formations (salt domes, salt bed formations, and underground mines or caves)

Although Bevill wastes are not hazardous wastes, EPA has determined that they are solid wastes, as defined in 40 CFR 261.2 (54 FR 36614, September 1, 1989) and thus are subject to Subtitle D requirements (see below).

*Resource Conservation and Recovery Act Subtitle D regulations, Criteria for Classification of Solid Waste Disposal Facilities and Practices, 40 CFR Part 257, Subpart A***.** These regulations are primarily siting requirements that limit the disposal of solid waste in certain locations. These regulations are *potentially applicable* to management and disposal of material generated by cleanup activity. The regulations require that facilities in floodplains not restrict the flow of the base flood, not reduce the temporary water storage capacity of the floodplain, not result in

washout of solid waste; and not cause or contribute to the taking of any endangered or threatened species. Facilities must not cause a discharge of pollutants into waters of the U.S. that violates the requirements of the NPDES program and must not contaminate an underground drinking water source beyond the solid waste boundary.

4.2.6 Native American Concerns and Cultural Resources Protection

Native American Graves Protection and Repatriation Act (NAGPRA), 25 USC§3001 et seq. 43 CFR Part 10. NAGPRA regulations protect Native American graves from desecration through the removal and trafficking of human remains and "cultural items" including funerary and sacred objects. To protect Native American burials and cultural items, the regulations require that if such items are inadvertently discovered during excavation, the excavation must cease and the affiliated tribes must be notified and consulted. This program is *potentially applicable* to ground-disturbing activities such as soil grading and removal.

American Indian Religious Freedom Act, 42 USC§1996 et seq. This statute is *potentially applicable* to soil excavation at the Midnite Mine site. It protects religious, ceremonial, and burial sites and the free practice of religions by Native American groups. If sacred sites are discovered in the course of soil disturbances, work will be stopped and the Spokane Tribe will be contacted.

National Historic Preservation Act (NHPA) regulations, 36 CFR Parts 60, 63, and 800. NHPA regulations require agencies to consider the possible effects on historic sites or structures of actions proposed for federal funding or approval and are *potentially applicable* to remedial actions at Midnite Mine. Historic sites or structures are those included on or eligible for the National Register of Historic Places, generally older than 50 years. If an agency finds a potential adverse effect on historic sites or structures, such agency must evaluate alternatives to "avoid, minimize, or mitigate" the impact, in consultation with the Tribal Historic Preservation Officer (THPO). The NHPA and implementing regulations are applicable to selected remedial activities such as mill building, demolition, and soil excavation, which could disturb historical sites or structures. In consultation with the THPO, unavoidable impacts on historic sites or structures may be mitigated through such means as taking photographs and collecting historical records.

4.2.7 Special Status Species

Endangered Species Act (ESA) regulations, 50 CFR Parts 17, 402. The ESA and implementing regulations make it unlawful to "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect" any federally designated threatened or endangered species. The ESA and implementing regulations are *potentially applicable* to remedial actions that could affect federally designated threatened or endangered species that may be present within the Midnite Mine site area.

The U.S. Fish and Wildlife Service has indicated that gray wolf (Federal Endangered) and the bald eagle, bull trout, Canada lynx, grizzly bear, and Ute ladies'-tresses (all Federal Threatened)

may occur in the vicinity of the project and could potentially be affected by it (letter from U.S. Fish and Wildlife Service to EPA contractor URS Corporation, September 5, 2001). Consistent with ESA Section 7, if any federally designated threatened or endangered species are identified in the vicinity of remediation work, EPA will consult with the U.S. Fish and Wildlife Service to ensure that remedial actions are conducted in a manner to avoid adverse habitat modification and jeopardy to the continued existence of such species.

4.2.8 Sensitive Environments

Protection of Floodplains, Executive Order 11988 (40 CFR Part 6, Appendix A). This executive order mandates that response actions taken by Federal agencies must be designed to avoid adverse impacts to floodplains. Specifically, if remediation activities are located within a 100-year floodplain, the activities must be designed to avoid adversely impacting floodplains wherever possible. If remedial activities were to take place in a floodplain, these requirements would be *potentially applicable*.

Protection of Wetlands, Executive Order 11990 (40 CFR Part 6, Appendix A). This executive order mandates that response actions taken by Federal agencies must be designed to avoid long- and short-term impacts to wetlands. If remediation activities are located near/in wetlands, the remediation activities must be designed to avoid adverse impact to the wetlands wherever possible, including minimizing wetlands destruction and preserving wetland values. If remedial activities were to take place in wetlands, these requirements would be *potentially applicable*.

Clean Water Act, Section 404—Dredge or Fill Requirements regulations, 33 CFR Parts 320-330; 40 CFR Part 230. These requirements are applicable to work in or near navigable waters. They establish requirements that limit the discharge of dredged or fill material into navigable waters and associated wetlands. EPA guidelines for discharge of dredged or fill materials in 40 CFR Part 230 specify consideration of alternatives that have less adverse impacts and prohibit discharges that would result in exceedance of surface water quality standards, exceedance of toxic effluent standards, and jeopardy of threatened or endangered species. Special consideration is required for "special aquatic sites," which are defined to include wetlands.

If remedial activities were to result in dredging or filling of waters of the U.S. or associated wetlands, these requirements would be *potentially applicable*. The term "Waters of the U.S." as currently defined in 33 CFR Part 328 includes waters used in interstate commerce, interstate waters including wetlands, and all other waters for which the use, degradation, or destruction of which could affect interstate commerce (the definition also includes tributaries of such waters). Note that this definition is currently the subject of an Advance Notice of Proposed Rulemaking (ANPR) on the CWA Regulatory Definition of "Waters of the U.S" (68 *Federal Register* 1991-1998, January 15, 2003). This ANPR and any proposed rule that could come out of this rulemaking process could not be an ARAR but could be a TBC (see below). The final rule from this rulemaking process could be potentially applicable.

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4.3 POTENTIAL TBCS

OSWER Directive No. 9200.4-18, Establishment of Cleanup Levels for CERCLA Sites with Radioactive Contamination (August 22, 1997). This directive presents clarifying guidance for establishing cleanup levels protective of human health for radioactive contamination at CERCLA sites. The cleanup levels are expressed as a risk, exposure, or dose level and not as a soil concentration level. The directive clarifies that the appropriate risk range for radionuclides, which are all carcinogens, is 10^{-4} to 10^{-6} (some NRC regulations do not achieve this range and are therefore not sufficiently protective). The directive further states that cancer risk at a site from both radiological and nonradiological contaminants should be summed, and CERCLA decision documents should provide an estimate of the combined risk to individuals presented by all carcinogenic contaminants.

Attachment A to the directive lists likely federal radiation ARARs, including whether they are likely to be applicable or to be relevant and appropriate. Attachment B indicates that EPA has consistently concluded that levels of less than or equal to 15 mrem/yr effective dose equivalent (corresponding to an excess lifetime cancer risk of approximately 3×10^{-4}) are protective and achievable.

OSWER Directive No. 9200.4-25, Use of Soil Cleanup Criteria in 40 CFR Part 192 as Remediation Goals for CERCLA Sites (February 12, 1998). This directive addresses the use of soil cleanup criteria in 40 CFR Part 192 when setting remediation goals for subsurface soil. The guidance clarifies the extent to which 40 CFR Part 192, Subpart A standards are potentially relevant and appropriate.

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Table 4-1
Potential Surface Water Quality ARARs for Protection of Human Health and Aquatic Life – Nonradiological Constituents

Constituent[a]	Protection of Aquatic Life[b] (µg/L)				Protection of Human Health[c] (µg/L)			
	Acute		Chronic		Consumption of Water and Organisms		Consumption of Organisms only	
	Spokane Tribe[d]	USEPA[e]	Spokane Tribe[d]	USEPA[e]	Spokane Tribe[d]	USEPA[e]	Spokane Tribe[d]	USEPA[e]
Aluminum (pH 6.5-9.0)	750	--	87	--	--	--	--	--
Antimony	--	--	--	--	13.4	5.6	324	640
Arsenic	340[m]	340[n]	150[m]	150[n]	0.0069[i]	0.018 [h,i,o]	0.0105[i]	0.14 [h,i,o]
Barium	--	--	--	--	1,000	--	--	--
Cadmium	3.7[g]	2.0[g]	1.03[g]	0.25[g]	--	--	--	--
Chromium III	549[g]	570[g]	74.1[g]	74[g]	--	--	--	--
Chromium VI	15	16	10	11	--	--	--	--
Copper	13.4[g]	13[g]	8.96[g]	9.0[g]	119	1,300 [j]	--	--
Iron	--	--	1,000	--	300	--	--	--
Lead	64.6[g]	65[g]	2.52[g]	2.5[g]	--	--	--	--
Mercury [f]	1.4	1.4	0.012	0.77	0.011	--	0.011	--
Nickel	468[g]	470[g]	52[g]	52[g]	231	610	345	4,600
Selenium	20	--	5.0	5.0[l]	145	170	845	4,200
Silver	3.45[g]	3.2[g]	--	--	--	--	--	--
Sulfide - H_2S	--	--	2.0	--		--	--	--
Thallium	--	--	--	--	0.388	0.24[k]	0.463	0.47[k]
Zinc	114[g]	120[g]	105[g]	120[g]	3,470	7,400 [j]	5,180	26,000 [j]

Notes

[a] Constituents from Quality Assurance Project Plan for the Midnite Mine (U.S. EPA 2000).

[b] All Spokane Tribe criteria listed for protection of aquatic life are for total recoverable metals except cadmium, chromium, copper, lead, nickel, silver, and zinc, which are measured as dissolved metals. All USEPA criteria listed for protection of aquatic life are for dissolved metals, except for selenium, which is for total recoverable metals.

[c] All criteria listed for protection of human health are for total recoverable metals.

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Table 4-1 (Continued)
Potential Surface Water Quality ARARs for Protection of Human Health and Aquatic Life – Nonradiological Constituents

[d]Spokane Tribe of Indians Surface Water Quality Standards, Resolution 2003-259 (March 7, 2003)
[e]National Recommended Water Quality Criteria: 2002, EPA Office of Water, November 2002, except where noted.
[f] Spokane Tribe mercury chronic criterion is based on human toxicity from bioaccumulation of mercury in fish tissue and is not based on toxicity to aquatic organisms. If ambient concentration exceeds 0.012 ug/L more than once during 3-year period the edible portion of aquatic species of concern must be analyzed to determine whether the concentration of methyl mercury exceeds the FDA action level of 1.0 mg/kg.
[g] Criterion is hardness dependent; calculated at hardness of 100 mg/L as $CaCO_3$. Actual ARAR is equation used to derive this value.
[h] Criteria in the matrix based on carcinogenicity (10^{-6} risk).
[i] This recommended water quality criterion refers to the inorganic form only.
[j] The organoleptic effect criterion is more stringent than the value for priority toxic pollutants.
[k]Human health criterion revised by EPA December 27, 2002 (67 *Federal Register* 79094).
[l]Expressed in terms of total recoverable metal in the water column-- can be converted to a dissolved metal concentration.
[m]In trivalent form only
[n]Derived from data for trivalent arsenic, but is applied here to total arsenic, which may imply that trivalent arsenic and hexavalent arsenic are equally toxic to aquatic life and that their toxicities are additive.
[o]EPA is currently assessing the human health criteria for arsenic.

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Table 4-2
Potential Surface Water ARARs for Radiological Constituents[a]

Constituent/Parameter	Unit	Surface Water Quality Standard[a]
Gross alpha particle activity		"Shall not exceed concentration from naturally occurring materials"
Radium 226 + Radium 228 (combined dissolved)	pCi/L	5
Gross alpha particle concentrations[b]	pCi/L	15
Tritium	pCi/L	20,000
Gross beta radiation concentration	pCi/L	50
Beta particle + photon radioactivity	millirem/yr	4[c]
Protactinium 234	pCi/L	30
Lead 206[d]	pCi/L	5.0
Lead 207[d]	pCi/L	5.0
Lead 208[d]	pCi/L	5.0
Lead 210	pCi/L	0.01
Lead 212	pCi/L	2.0
Polonium 210	pCi/L	0.04
Radium 226	pCi/L	0.06
Thorium 232	pCi/L	0.03
Thorium 234	pCi/L	5.0
Uranium 234	pCi/L	0.30
Uranium 235	pCi/L	0.30
Uranium 238	pCi/L	0.30
Uranium (natural)	pCi/L	0.30

[a] Spokane Tribe of Indians Surface Water Quality Standards, Resolution 2003-259 (March 7, 2003).

[b] Including Radium-226 but excluding radon and uranium.

[c] Annual dose equivalent to the total body or any internal organ.

[d] Lead 206, Lead 207, and Lead 208 are the stable end members of the Uranium 238, Uranium 235, and Thorium 232 decay chains and therefore are not radioactive. The sum of Lead 206, Lead 207, and Lead 208 shall not exceed 5 µg/L.

pCi/L = picocuries per liter

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Table 4-3
Potential Surface Water Quality ARARs for Protection of Human Health for Exposure from Primary Contact Ceremonial and Spiritual Uses[a]

Constituent/Parameter	Concentration (µg/L unless otherwise indicated)
Aluminum	50
Antimony	6
Arsenic	50
Barium	1,000
Beryllium	4
Cadmium	5
Chloride	250,000
Chromium (total)	100
Copper	1,000
Fluoride	2,000
Iron	300
Manganese	50
Mercury	2
Nitrate (as N)	10,000
Nitrite (as N)	1,000
Total Nitrate + Nitrite (as N)	10,000
pH	6.5-8.5 std. units
Selenium	50
Silver	100
Sulfate	250,000
Thallium	2
Total dissolved solids (TDS)	500,000
Tritium	20,000 (pCi/L)
Zinc	5,000

[a] Spokane Tribe of Indians Surface Water Quality Standards Resolution 2003-259 (March 7, 2003).
µg/L = micrograms per liter
pCi/L = picocuries per liter

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Table 4-4
Potential ARARs for Groundwater Protection

Chemical Constituent	Units	Primary Maximum Contaminant Levels (MCLs)[a] 40 CFR Part 141	Maximum Groundwater Protection Values[b] 40 CFR Part 192
Antimony	µg/L	6	--
Arsenic	µg/L	10	50
Barium	µg/L	2,000	1,000
Beryllium	µg/L	4	--
Cadmium	µg/L	5	10
Chromium (total)	µg/L	100	50
Cyanide (as free cyanide)	µg/L	200	--
Copper	µg/L	1,300[c]	--
Fluoride	µg/L	4,000	--
Lead	µg/L	15[c]	50
Mercury	µg/L	2	2
Molybdenum	µg/L	--	100
Nitrate (as N)	µg/L	10,000	10,000
Nitrite (as N)	µg/L	1,000	--
Selenium	µg/L	50	10
Silver	µg/L	--	50
Thallium	µg/L	2	--
Turbidity	NTU	1	--
Combined Radium-226 and Radium-228	pCi/L	5	5
Combined Uranium-234 and Uranium-238	pCi/L	--	30[d]
Uranium	µg/L	30	--
Alpha particles	pCi/L	15[e]	15[e]
Beta particles and photon emitters	millirem/ year	4	--

[a] MCLs listed at the following EPA website, accessed February 10, 2003: http://www.epa.gov/safewater/mcl.html.

[b] Maximum Concentration of Constituents for Groundwater Protection, listed in 40 CFR Part 192, Subpart A, Table 1.

[c] Action levels rather than MCLs.

[d] Combined U-234 and U-238. Where secular equilibrium obtains, this criterion will be satisfied by a concentration of 0.044 milligrams per liter (or 44 ug/L). For conditions of other than secular equilibrium, a corresponding value may be derived and applied, based on the measured site-specific ratio of the two isotopes of uranium.

[e] MCL excludes contribution from radon and uranium

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5.0 PRELIMINARY REMEDIAL ACTION OBJECTIVES

This section presents the preliminary remedial action objectives (RAOs) for each medium of concern at Midnite Mine. The preliminary RAOs are medium-specific or area-specific goals for protecting human health and the environment. The RAOs presented in the draft FS will specify COPCs and media of concern, exposure routes and receptors, and acceptable COPC levels for each exposure route.[3] These acceptable exposure routes and levels are typically based on the results of the baseline human health and ecological risk assessments. This draft technical memorandum was written concurrently with the risk assessments and RI. As a result, the preliminary RAOs presented in this technical memorandum do not identify specific exposure routes, receptors, or acceptable exposure levels.

The acceptable COPC levels are termed preliminary remediation goals (PRGs) and will not be set lower than background levels. The ongoing development of PRGs is described in Section 6. The preliminary RAOs are presented in Table 5-1. Table 5-1 also lists general response actions. General response actions are medium-specific actions that may satisfy the RAOs.

Human health remediation goals will be based on the anticipated future land use at the site. Environmental media in unimpacted areas near the site contain naturally elevated levels of certain metals and radionuclides. Generally, under CERCLA, cleanup levels are not set at concentrations below natural background levels. In order to achieve levels comparable to background and to control the generation of acid mine drainage, it is likely that a containment remedy, such as a cover, will be necessary over much of the site. This would probably be the case in some areas even if all mining wastes were removed from the site.

Generally, when containment is part of the selected remedy, institutional controls (for example, restrictions on digging or drilling) must be included to ensure the long-term effectiveness of containment. For this reason, unrestricted residential use of the site will not be considered. Restricted use of the site for residential or industrial purposes, while theoretically possible, would require effective institutional controls, advance planning of specific land use needs, and design engineering to facilitate such uses. Grading of the surface, cover characteristics and thickness, planning for roads and utilities, and other aspects would need to be consistent with the primary environmental objectives, which include controlling surface and ground water, reducing the potential for direct contact with surface materials and other contaminated media, and reducing radon flux. Monitoring and maintenance would also be necessary. The time, effort and costs to address these elements in both the planning and implementation stage may be disproportionate to the benefits of making such land uses available.

[3] RAOs identify acceptable COPC levels and exposure routes because protectiveness can be achieved by reducing exposure (e.g., by capping) as well as by reducing COPC levels (e.g., by treatment or removal).

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EPA will develop cleanup alternatives and may include one or more alternatives which involve restricted land use. The alternatives will be evaluated in the feasibility study using the nine NCP criteria, which include cost, implementability, and long-term protectiveness. EPA will then select the remedy for the site after considering public comment and consulting with the Spokane Tribe.

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Table 5-1
Preliminary Remedial Action Objectives and General Response Actions

Media of Concern	Preliminary Remedial Action Objectives (See notes 1, 2, and 3)	Preliminary General Response Actions (See note 6)
Surface and stockpiled material and sediments (See note 4)	Reduce exposure of humans and ecological receptor populations to COPCs in mining-affected surface and stockpiled material and sediments to levels that comply with ARARs and do not result in unacceptable risks. (See note 4) Reduce exposure of individuals of special-status biota protected under the ESA and the MBTA to COPCs in surface material and sediments within habitat areas supportive of these biota that result in unacceptable risks. Reduce loadings of COPCs from surface and stockpiled materials and sediments to surface water and groundwater so that loadings do not cause exceedances of potential surface water and groundwater quality ARARs or result in unacceptable risks. Reduce environmental transport of mining-affected surface material from the MA to areas outside of the MA. Prevent future removal of mining-affected surface and stockpiled material.	Institutional Controls Containment/Consolidation - Segregation - Consolidation - Regrading and revegetation - Cover system - Bioengineered stream channel and banks Removal and Relocation - Onsite disposal in open pits - Onsite disposal in above ground cell - Offsite disposal Ex-Situ Treatment - Stabilization - Solidification In-Situ Treatment - Solidification Beneficiation/Processing
Surface Water (See note 5)	Reduce exposure of humans and ecological receptor populations to COPCs in surface water to levels that comply with ARARs and do not result in unacceptable risks. Reduce exposure of individuals of special-status biota protected under the ESA and the MBTA to COPCs in surface water within habitat areas supportive of these biota that result in unacceptable risks. Reduce infiltration of surface water into acid mine drainage (AMD)-generating materials and reduce erosion and environmental transport of mining-affected surface materials by surface water. Reduce loadings of COPCs from surface water to groundwater so that loadings do not	Institutional Controls Containment - Surface water controls Removal - Dewater open pits - Backfill pits Collection and Treatment In-Situ Treatment

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Table 5-1 (Continued)
Preliminary Remedial Action Objectives and General Response Actions

Media of Concern	Preliminary Remedial Action Objectives (See notes 1, 2, and 3)	Preliminary General Response Actions (See note 6)
	cause exceedances of potential groundwater quality ARARs or result in unacceptable risks.	
Groundwater	Reduce exposure of humans to COPCs in groundwater to levels that comply with ARARs and do not result in unacceptable risks. Reduce loadings of COPCs from groundwater to surface water so that loadings do not cause exceedances of potential surface water quality ARARs or result in unacceptable risks.	Institutional Controls Containment/Source Control - Hydraulic barrier - Physical barrier - Permeable reactive barrier Collection and Treatment In-Situ Treatment
Air	Reduce exposure of humans to radon-222 or its decay products by limiting the average radon-222 release rate from radioactive materials to levels that comply with ARARs and do not result in unacceptable risk.	Institutional Controls Containment
Plants	Reduce exposure of humans and animals to COPCs in plant material at levels that result in unacceptable risks.	Institutional Controls Surface and Stockpiled Material, Sediment, Surface Water, and Groundwater GRAs

Notes
1. Remediation goals will not be less than background levels determined in the RI.
2. Remedial actions that would cause unacceptable adverse impacts to ecosystems or habitats would not be implemented.
3. Unacceptable risks are defined as excess cancer risks exceeding 10^{-4} to 10^{-6} for carcinogenic COPCs and excess hazard quotients exceeding 1 for non-carcinogenic COPCs.
4. Surface and stockpiled material includes soil, ore, protore, waste rock, overburden, including these materials used in haul road construction. Sediments include sediments in pits, ponds, creeks, and drainages.
5. Surface water includes seeps, pit water, ponds, creeks, and drainages.
6. General response actions for all media include no action. Institutional controls for all media include access or use restrictions and/or monitoring.

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6.0 PRELIMINARY REMEDIATION GOALS

This section describes the ongoing development of preliminary remediation goals (PRGs) for surface water, groundwater, surface and stockpiled material, sediment, and air. PRGs are typically based on readily available information such as standards (i.e., ARARs), existing risk-based PRGs that have been developed by various EPA regions, site-specific risk-based concentrations that are calculated based on the results of the human health and ecological baseline risk assessments, and background levels. PRGs may be different in different areas of the site, based on receptors and exposure pathways present in these areas. The potential PRGs presented in this section may be revised as information from the risk assessments and the RI becomes available.

Background levels are currently under development and will be selected for each COPC and medium of concern. The selected background level will be used to represent the minimum PRG for all affected areas even if it exceeds an ARAR or risk-based concentration. Where ARARs or risk-based PRGs are greater than the selected background level, the ARAR or risk-based PRG will be used to represent the PRG.

OSWER Directive No. 9200.4-23 (U.S. EPA 1997) states that it is EPA's policy that ARARs will generally be considered protective absent multiple contaminants or pathways of exposure. However, the Directive also states that, in rare situations, PRGs may be selected that are more protective than ARARs:

> "EPA Regional offices should establish PRGs at levels more protective than required by a given ARAR, even absent multiple pathways or contaminants, where application of the ARAR would not be protective of human health or the environment. This judgment should be made based on a review of the level of risk associated with application of the ARAR; the soundness of the technical basis for the ARAR; and other factors relating to the ARAR or to its application at an individual site."

For example, ARARs may be based on less intensive exposure to environmental media than some exposures specific to a traditional tribal lifestyle. In this case, PRGs may be established that are more protective than ARARs to protect persons that may practice a traditional lifestyle.

PRGs will apply to exposure pathways determined to be complete and significant by the HHRA. PRGs for protection of ecological receptors will be evaluated for the potential for causing unacceptable adverse impacts to ecosystems or habitats before implementation of any remedial actions.

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6.1 PRGs FOR SURFACE WATER

Table 6-1 presents potential PRGs and ecological benchmarks for surface water. The Spokane Tribe surface water quality standards are potential PRGs for surface water. Where tribal surface water quality standards are not available, the National Recommended Water Quality Criteria may be used as PRGs for surface water. The federal drinking water standards are potential PRGs for surface water where it may be used as drinking water.

Where ARARs are not available, risk-based concentrations, such as the EPA Region IX list of PRGs for tap water, are potential PRGs for surface water for protection of human health. These PRGs are calculated using standard exposure assumptions and values of exposure parameters. The PRGs may be calculated using exposure assumptions and values of exposure parameters that are specific to the Tribe.

The ecological benchmarks presented in Table 6-1 will be used in the ERA for screening COPCs where potential ARARs are not available. These benchmarks are not based on site-specific conditions and do not represent PRGs. PRGs will be selected based on the results of the ERA and may be based on toxicity reference values or site-specific RBCs.

6.2 PRGs FOR GROUNDWATER

Table 6-2 presents potential PRGs for groundwater. The federal drinking water standards are potential PRGs for groundwater where it may be used as drinking water. Groundwater protection standards under UMTRCA are potential PRGs for groundwater. Similar to surface water, risk-based concentrations, such as the EPA Region IX list of PRGs for tap water, are potential PRGs for groundwater where ARARs are not available. These PRGs are calculated using standard exposure assumptions and values of exposure parameters. The PRGs may be calculated using exposure assumptions and values of exposure parameters that are specific to the Tribe.

PRGs for groundwater may also be established based on protection of surface water. In this case, the PRGs for groundwater at the location where groundwater discharges to surface water will be based on surface water ARARs.

6.3 PRGs FOR SURFACE AND STOCKPILED MATERIAL AND SEDIMENTS

Tables 6-2 and 6-3 present potential PRGs and ecological benchmarks for surface and stockpiled material and sediment, respectively. UMTRCA is a source of potential PRGs for radionuclides in surface and stockpiled material, as described in Section 4.2.4 of this document. With the exception of UMTRCA, ARARs are typically not available for development of PRGs for surface and stockpiled material and sediments. Where ARARs are not available, PRGs will be based on

risk-based concentrations (RBCs). The EPA Region IX list of PRGs for residential and industrial soil is one source for RBCs. These PRGs are calculated using standard exposure assumptions and values of exposure parameters. The PRGs may be calculated using exposure assumptions and values of exposure parameters that are specific to the Tribe. The soil screening levels for radionuclides (OSWER Directive 9355.4-16, EPA 2000) are intended to identify sites where no further action is required for residential use and are not intended to be used as PRGs.

ARARs do not exist for protection of ecological receptors from exposure to surface and stockpiled material and sediment. Ecological benchmarks presented in the literature (Efroymson, et al. 1997a, 1997b; MacDonald, et al. 2000; EVS Environmental Consultants 1998; Environment Canada 2000) will be used in the ERA to identify ecological COPCs; however, these benchmarks are not based on site-specific conditions and do not represent PRGs. PRGs will be selected based on the results of the ERA and may be based on toxicity reference values or site-specific RBCs. Ecological benchmarks for surface and stockpiled material and sediment are presented in Tables 6-3 and 6-4, respectively.

6.4 PRGs FOR AIR

For air, the PRG for radon-222 or its decay products will be the greater of either the site-specific background release rate or the EPA standard for radon release rates (20 picocuries per square meter per second) at inactive uranium mill tailings sites closed under 40CFR192.02(b)(1) and 40CFR61.222(a).

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Table 6-1
Potential PRGs and Ecological Benchmarks for Surface Water

					Human Health Values					Ecological Values		
Constituent	Human Health COPC	Preliminary Ecological COPC[a]	Units	Background 95% UTL[h]	Tribal WQS Consumption of Water + Org.[d]	Tribal Drinking Water PRG[c]	Tribal WQS Ceremonial and Spiritual Use[d]	SDWA Drinking Water Standards	CWA Consump of Water + Org.[f]	Tribal Protection of Aquatic Org.[d,e]	CWA Protection of Aquatic Org.[e,f]	Ecological Benchmark[b]
Radionuclides												
Gross Alpha	x		pCi/L	52	15	--	--	15	--	--	--	--
Lead 210	x		pCi/L	2.5	0.01	--	--	--	--	--	--	--
Polonium 210			pCi/L	6.2	2.0	--	--	--	--	--	--	--
Radium 226		x	pCi/L	1.8	0.06	--	--	5	--	--	--	--
Radium 228		x	pCi/L	2.6	--	--	--	5	--	--	--	--
Radon 222, Calculated	x		pCi/L	3,373	--	--	--	--	--	--	--	--
Thorium 227			pCi/L	0.29	--	--	--	--	--	--	--	--
Thorium 228			pCi/L	3.3	--	--	--	--	--	--	--	--
Thorium 230			pCi/L	3.6	--	--	--	--	--	--	--	--
Thorium 232		x	pCi/L	1.5	0.03	--	--	--	--	--	--	--
Uranium 234	x	x	pCi/L	8.8	5.0	--	--	--	--	--	--	--
Uranium 235		x	pCi/L	0.28	0.30	--	--	--	--	--	--	--
Uranium 238	x	x	pCi/L	7.6	0.30	--	--	--	--	--	--	--
Total Inorganics												
Aluminum	x	x	Ug/l	9,073	--	17,500	50	--	--	87[h]	--	--
Antimony	x		Ug/l	1.6	13.4	7	6	6	5.6	--	--	30
Arsenic			Ug/l	18	0.0069	0.011	50	10	0.018[o]	150[j]	--	--
Barium		x	Ug/l	165	1,000	1,225	1,000	2,000	--	--	--	3.9
Beryllium	x	x	Ug/l	0.23	--	35	4	4	--	--	--	0.53
Cadmium	x	x	Ug/l	0.50	--	9	5	5	--	--	--	--
Chromium		x	Ug/l	4.9	--	53	100	100	--	--	--	--
Cobalt	x	x	Ug/l	3.0	--	350	--	--	--	--	--	3
Copper		x	Ug/l	9.6	119	648	1,000	1,300	1,300	--	--	--
Iron		x	Ug/l	5,784	300	5,250	300	--	--	1,000	--	--
Lead	x	x	Ug/l	4.7	--	--	--	15	--	--	--	--
Manganese	x	x	Ug/l	72	--	420	50	--	--	--	--	80
Mercury		x	Ug/l	0.1	0.011	5	2	2	--	0.012[i]	--	--
Molybdenum			Ug/l	12	--	88	--	--	--	--	--	--
Nickel	x	x	Ug/l	4.9	231	350	--	--	610	--	--	--

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Table 6-1 (Continued)
Potential PRGs and Ecological Benchmarks for Surface Water

					Human Health Values					Ecological Values		
Constituent	Human Health COPC	Preliminary Ecological COPC[a]	Units	Background 95% UTL[h]	Tribal WQS Consumption of Water + Org.[d]	Tribal Drinking Water PRG[c]	Tribal WQS Ceremonial and Spiritual Use[d]	SDWA Drinking Water Standards	CWA Consump of Water + Org.[f]	Tribal Protection of Aquatic Org.[d,e]	CWA Protection of Aquatic Org.[e,f]	Ecological Benchmark[b]
Selenium		x	Ug/l	0.59	145	88	50	50	170	5.0	--	--
Silver		x	ug/l	0.8	--	88	100	--	--	--	--	0.08
Thallium		x	ug/l	1.1	0.388	1	2	2	0.24[k]	--	--	4
Uranium	x	x	ug/l	20	--	4	--	30	--	--	--	2.6
Vanadium		x	ug/l	7.8	--	123	--	--	--	--	--	19
Zinc	x	x	ug/l	10	3,470	5,250	5,000	--	7,400	--	--	--
Dissolved Inorganics												
Aluminum	x	x	ug/l	1,241	--	--	--	--	--	--	--	--
Antimony	x	x	ug/l	2.3	--	--	--	--	--	--	--	30
Arsenic			ug/l	13	--	--	--	--	--	--	150	
Barium		x	ug/l	113	--	--	--	--	--	--	--	3.9
Beryllium		x	ug/l	0.1	--	--	--	--	--	--	--	0.53
Cadmium	x	x	ug/l	0.5	--	--	--	--	--	1.03[g]	0.25[g]	--
Chromium		x	ug/l	0.63	--	--	--	--	--	--	--	--
Chromium III			ug/l		--	--	--	--	--	74.1[g]	74[g]	--
Chromium VI	x		ug/l		--	--	--	--	--	10	11	--
Cobalt	x	x	ug/l	1.4	--	--	--	--	--	--	--	3
Copper	x	x	ug/l	2.6	--	--	--	--	--	8.96[g]	9.0[g]	--
Iron		x	ug/l	5,105	--	--	--	--	--	--	--	--
Lead	x	x	ug/l	1.2	--	--	--	--	--	2.52[g]	2.5[g]	--
Manganese	x	x	ug/l	49	--	--	--	--	--	--	--	80
Mercury		x	ug/l	--	--	--	--	--	--	--	0.77	--
Molybdenum			ug/l	--	--	--	--	--	--	--	--	--
Nickel	x	x	ug/l	1.4	--	--	--	--	--	52[g]	52[g]	--
Selenium			ug/l	0.33	--	--	--	--	--	--	--	--
Silver		x	ug/l	0.9	--	--	--	--	--	--	--	0.08
Thallium		x	ug/l	7,173	--	--	--	--	--	--	--	4
Uranium			ug/l	--	--	--	--	--	--	--	--	--
Vanadium		x	ug/l	2.4	--	--	--	--	--	--	--	19
Zinc		x	ug/l	14	--	--	--	--	--	105[g]	120[g]	--

PRELIMINARY DRAFT

Table 6-1 (Continued)
Potential PRGs and Ecological Benchmarks for Surface Water

indicates constituent is not a COPC for human health or a preliminary COPC for ecological protection

[a]Preliminary ecological COPCs for radionuclides are for combined surface water and sediment.

[b]Freshwater benchmarks derived from EPA regions. Benchmarks are presented for constituents that do not have a chronic Tribal water quality standard or national recommended water quality criterion. Note: ecological benchmarks are not based on site-specific conditions and do not represent PRGs.

[c]Tribal specific PRGs were calculated using EPA Region 9 tap water PRG equations and toxicity criteria with site specific tribal exposure assumptions for domestic use of groundwater.

[d]Spokane Tribe of Indians Surface Water Quality Standards, Resolution 2001-144 (February 13, 2001). Standards for total inorganics are for consumption of water and organisms.

[e]Criteria for chronic exposure

[f] National Recommended Water Quality Criteria: 2002, EPA Office of Water, November 2002, except where noted.

[g] Criterion is hardness dependent; calculated at hardness of 100 mg/L as $CaCO_3$. Actual ARAR is equation used to derive this value. A hardness of 30 mg/L as CaCO3 was used in the ecological COPC screening.

[h] 95% upper tolerance limit

[i] Spokane Tribe mercury chronic criterion is based on human toxicity from bioaccumulation of mercury in fish tissue and is not based on toxicity to aquatic organisms. If ambient concentration exceeds 0.012 ug/L more than once during 3-year period the edible portion of aquatic species of concern must be analyzed to determine whether the concentration of methyl mercury exceeds the FDA action level of 1.0 mg/kg.

PRELIMINARY DRAFT

Table 6-2
Potential PRGs for Groundwater

Constituent	Human Health COPC	Preliminary Ecological COPC[e]	Units	Background 95% UTL[i]	Tribal Drinking Water PRG[a]	SDWA Drinking Water Standard	UMTRCA GW Protection[c]	Protection of Surface Water for Human Health[b]	Protection of Surface Water for Ecological[d]
Radionuclides									
Gross Alpha	x		pCi/L	189	--	15	--	--	--
Lead 210			pCi/L	70	--	--	--	--	--
Polonium 210			pCi/L	28	--	--	--	--	--
Radium 226	x	x	pCi/L	12	--	5	5[f]	--	--
Radium 228		x	pCi/L	13	--	5	5[f]	--	--
Radon 222, Calculated			pCi/L	89,155	--	--	--	--	--
Thorium 227			pCi/L	0.84	--	--	--	--	--
Thorium 228			pCi/L	2.5	--	--	--	--	--
Thorium 230			pCi/L	6.4	--	--	--	--	--
Thorium 232		x	pCi/L	3.4	--	--	--	--	--
Uranium 234	x	x	pCi/L	37	--	--	30[g]	--	--
Uranium 235		x	pCi/L	2.3	--	--	--	--	--
Uranium 238	x	x	pCi/L	35	--	--	30[g]	--	--
Total Inorganics									
Aluminum		x	ug/l	35,272	17,500	--	--	--	87[j]
Antimony			ug/l	7.1	7	6	--	13.4	--
Arsenic			ug/l	78	0.011	10	50	0.0069	150
Barium			ug/l	127	1,225	2,000	1,000	116	--
Beryllium	x		ug/l	2.7	35	4	--	--	--
Cadmium	x	x	ug/l	0.52	9	5	10	--	1.03[h]
Chromium[k]			ug/l	74	53	100	50	--	
Cobalt	x		ug/l	17	350	--	--	--	--
Copper		x	ug/l	80	648	1,300	--	119	8.96[h]
Iron		x	ug/l	36,500	5,250	--	--	42.7	1,000
Lead		x	ug/l	25	NE	15	50	--	2.52[h]
Manganese	x		ug/l	1,990	420	--	--	--	--
Mercury			ug/l	0.2	5	2	2	0.00405	0.012
Molybdenum			ug/l	--	--	--	100	--	--
Nickel	x	x	ug/l	57	350	--	--	231	52[h]
Selenium		x	ug/l	2.2	88	50	10	124	5.0
Silver	x		ug/l	0.9	88	--	50	--	--

PRELIMINARY DRAFT

Table 6-2 (Continued)
Potential PRGs for Groundwater

Constituent	Human Health COPC	Preliminary Ecological COPC[e]	Units	Background 95% UTL[i]	Tribal Drinking Water PRG[a]	SDWA Drinking Water Standard	UMTRCA GW Protection[c]	Protection of Surface Water for Human Health[b]	Protection of Surface Water for Ecological[d]
Thallium			ug/l	1.3	1	2	--	0.388	--
Uranium	x	x	ug/l	88	4	30	--	--	--
Vanadium			ug/l	28	123	--	--	--	--
Zinc	x	x	ug/l	190	5,250	--	--	3,333	105[h]
Dissolved Inorganics									
Aluminum	x	x	ug/l	5,231	--	--	--	--	--
Antimony			ug/l	3.9	--	--	--	--	--
Arsenic			ug/l	106	--	--	--	--	150
Barium			ug/l	68	--	--	--	--	--
Beryllium	x		ug/l	0.79	--	--	--	--	--
Cadmium	x	x	ug/l	0.27	--	--	--	--	0.25[h]
Chromium			ug/l	12	--	--	--	--	74[h]
Cobalt	x		ug/l	4.5	--	--	--	--	--
Copper	x	x	ug/l	3.2	--	--	--	--	9.0[h]
Iron		x	ug/l	55,035	--	--	--	--	--
Lead	x		ug/l	0.89	--	--	--	--	2.5[h]
Manganese	x		ug/l	1,930	--	--	--	--	--
Mercury			ug/l	0.2	--	--	--	--	0.77
Molybdenum			ug/l	83	--	--	--	--	--
Nickel	x	x	ug/l	14	--	--	--	--	52[h]
Selenium		x	ug/l	0.95	--	--	--	--	--
Silver	x		ug/l	1.2	--	--	--	--	--

PRELIMINARY DRAFT

Table 6-2 (Continued)
Potential PRGs for Groundwater

Constituent	Human Health COPC	Preliminary Ecological COPC[e]	Units	Background 95% UTL[i]	Tribal Drinking Water PRG[a]	SDWA Drinking Water Standard	UMTRCA GW Protection[c]	Protection of Surface Water for Human Health[b]	Protection of Surface Water for Ecological[d]
Thallium			ug/l	1.1	--	--	--	--	--
Uranium			ug/l		--	--	--	--	--
Vanadium			ug/l	4.8	--	--	--	--	--
Zinc	x	x	ug/l	181	--	--	--	--	120[h]

indicates constituent is not a COPC for human health or a preliminary COPC for ecological protection

[a]Tribal-specific PRGs were calculated using EPA Region 9 tap water PRG equations and toxicity criteria with site-specific tribal exposure assumptions for domestic use of groundwater.

[b]Spokane Tribe water quality standard or national recommended water quality criteria for consumption of water and organisms. Tribe standards for spiritual or ceremonial use are not included. Assumes no dilution of groundwater by surface water containing lower concentrations of COPCs.

[c]Maximum Concentration of Constituents for Groundwater Protection, listed in 40 CFR Part 192, Subpart A, Table 1.

[d]Spokane Tribe water quality standard or national recommended water quality criterion for protection of aquatic organisms. Assumes no dilution of groundwater by surface water containing lower concentrations of COPCs.

[e]Preliminary ecological COPCs for surface water, based on contamination of surface water being the primary ecological concern for groundwater.

[f]Combined Radium 226 and Radium 228

[g]Combined Uranium 234 and Uranium 238

[h] The associated surface water criterion is hardness dependent; calculated at hardness of 100 mg/L as CaCO3. Actual surface water ARAR is equation used to derive this value.

[i] 95% upper tolerance limit

[j]pH 6.5-9.0

[k]Chromium VI toxicity criteria was used in the calculation of the Tribal PRG.

PRELIMINARY DRAFT

Table 6-3
Potential PRGs and Ecological Benchmarks for Surface and Stockpiled Material

Constituent	Human Health COPC	Preliminary Ecological COPC	Units	Background 95% UTL[e]	Human Health			Lowest Ecological Benchmark[c]
					Residential use screening value[a]	Region IX Industrial PRG	UMTRCA[b]	
Radionuclides								
Lead 210	x		pCi/g	7.5	--	--	--	--
Polonium 210			pCi/g	5.7	--	--	--	--
Radium 226	x	x	pCi/g	4.7	--	--	9.7/19.7	--
Radium 228		x	pCi/g	3.8	--	--	8.8/18.8	--
Thorium 227			pCi/g	0.44	--	--	--	--
Thorium 228	x		pCi/g	3.9	--	--	--	--
Thorium 230			pCi/g	4.4	--	--	9.4/19.4	--
Thorium 232		x	pCi/g	3.7	--	--	8.7/18.7	--
Uranium 234		x	pCi/g	18	--	--	--	--
Uranium 235		x	pCi/g	0.51	--	--	--	--
Uranium 238		x	pCi/g	14	--	--	--	--
Total Inorganics								
Aluminum		x	mg/kg	18,453	7,600	100,000	--	50
Antimony			mg/kg	1.3	3.1	410	--	5
Arsenic	x	x	mg/kg	86	0.039	1.6	--	10
Barium			mg/kg	401	540	67,000	--	500
Beryllium			mg/kg	1.3	15	1,900	--	10
Cadmium		x	mg/kg	0.32	3.7	450	--	3
Chromium[f]	x	x	mg/kg	18	21	450	--	0.4
Cobalt			mg/kg	21	90	1,900	--	20
Copper		x	mg/kg	42	310	4,100	--	50
Iron		x	mg/kg	33,521	2,300	100,000	--	200
Lead[g]		x	mg/kg	13	400	750	--	50
Manganese		x	mg/kg	1,445	180	19,000	--	100
Mercury			mg/kg	0.10	2.3		--	0.1
Molybdenum		x	mg/kg	4	39	5,100	--	2

PRELIMINARY DRAFT

Table 6-3 (Continued)
Potential PRGs and Ecological Benchmarks for Surface and Stockpiled Material

Constituent	Human Health COPC	Preliminary Ecological COPC	Units	Background 95% UTL[e]	Human Health			Lowest Ecological Benchmark[c]
					Residential use screening value[a]	Region IX Industrial PRG	UMTRCA[b]	
Nickel		x	mg/kg	21	160	20,000	--	30
Selenium	x	x	mg/kg	0.52	39	5,100	--	1
Silver			mg/kg	0.11	39	5,100	--	2
Thallium	x	x	mg/kg	0.22	0.52	67	--	1
Uranium	x	x	mg/kg	43	1.6	200	--	5
Vanadium	x	x	mg/kg	40	55	7,200	--	2
Zinc		x	mg/kg	51	2,300	100,000	--	50

indicates constituent is not a COPC for human health or a preliminary COPC for ecological protection

Note: Exposures to airborne radon will also be addressed through surface and stockpiled material response actions.

[a]One-tenth of EPA's Region 9 residential soil PRG, used for screening of COPCs for the human health risk assessment

[b]Flux averaged over 100 square meters. The first number is the flux averaged over first 15 cm of soil below surface (background plus 5 pCi/g). The second number is the flux averaged over 15 cm thick layers of soil more than 15 cm below surface (background plus 15 pCi/g).

[c]Screening benchmarks for plants, soil microorganisms, and earthworms published by Oak Ridge National Laboratory (ORNL) (Efroymson et al. 1997a,b). Note: ecological benchmarks are not based on site-specific conditions and do not represent PRGs.

[e] 95% upper tolerance limit

[f]1:6 ratio of Cr VI:Cr III

[g]The lead human health PRGs are based on EPA models, IEUBK 1994 and TRW 1996. Lead is evaluated differently than all other metals and the PRG takes into account additive exposures. Therefore, the lead residential PRG was not divided by 10.

PRELIMINARY DRAFT

Table 6-4
Potential PRGs and Ecological Benchmarks for Sediment

Constituent	Human Health COPC	Preliminary Ecological COPC[c]	Units	Background 95% UTL[d]	Residential Use Screening Value[a]	Region IX Industrial PRG	Ecological Benchmark[b]
Radionuclides							
Lead 210	x		pCi/g	20	--	--	--
Polonium 210			pCi/g	17	--	--	--
Radium 226	x	x	pCi/g	13	--	--	--
Radium 228		x	pCi/g	5.3	--	--	--
Thorium 227			pCi/g	0.88	--	--	--
Thorium 228			pCi/g	6.0	--	--	--
Thorium 230			pCi/g	8.1	--	--	--
Thorium 232		x	pCi/g	5.1	--	--	--
Uranium 234	x	x	pCi/g	41	--	--	--
Uranium 235		x	pCi/g	2.3	--	--	--
Uranium 238	x	x	pCi/g	31	--	--	--
Total Inorganics							
Aluminum		x	mg/kg	22,906	7,600	100,000	9,400
Antimony		x	mg/kg	1.0	3.1	410	0.49
Arsenic		x	mg/kg	181	0.039	1.6	9.8
Barium		x	mg/kg	368	540	67,000	500
Beryllium		x	mg/kg	2.5	15	1,900	0.7
Cadmium	x	x	mg/kg	1.0	3.7	450	0.99
Chromium		x	mg/kg	23	21	450	43
Cobalt	x	x	mg/kg	14	90	1,900	20
Copper		x	mg/kg	35	310	4,100	32
Iron		x	mg/kg	28,442	2,300	100,000	10,000
Lead[e]			mg/kg	21	400	750	36
Manganese	x	x	mg/kg	1,179	180	19,000	740
Mercury		x	mg/kg	0.13	2.3		0.18
Molybdenum		x	mg/kg	11	39	5,100	---
Nickel	x	x	mg/kg	23	160	20,000	23
Selenium		x	mg/kg	1.7	39	5,100	0.1
Silver		x	mg/kg	0.15	39	5,100	0.5
Thallium	x		mg/kg	0.45	0.52	67	3.8
Uranium	x	x	mg/kg	93	1.6	200	17
Vanadium		x	mg/kg	41	55	7,200	---
Zinc		x	mg/kg	132	2,300	100,000	120

indicates constituent is not a COPC for human health or a preliminary COPC for ecological protection

Note: Exposures to airborne radon will also be addressed through sediment response actions.

[a]One-tenth of EPA's Region 9 residential soil PRG

[b] Proposed sediment benchmarks are initially derived from the Consensus-based TEC database (MacDonald, 2000). If a Consensus-based TEC value was not available, then the lowest Sediment Quality Guideline (SQG) was selected as the benchmark. All SQG values, except uranium, are derived from EVS Environmental Consultants (1998). Uranium is derived from Environment Canada (2000) guidelines. Note: ecological benchmarks are not based on site-specific conditions and do not represent PRGs.

[c]Preliminary ecological COPCs for radionuclides are for combined surface water and sediment.

[d] 95% upper tolerance limit

[e]The lead human health PRGs are based on EPA models, IEUBK 1994 and TRW 1996. Lead is evaluated differently than all other metals and the PRG takes into account additive exposures. Therefore, the lead residential PRG was not divided by 10.

PRELIMINARY DRAFT

7.0 REFERENCES

Efroymson, R. A., M. E. Will, G. W. Suter, II, and A.C. Wooten. 1997a. Toxicological Benchmarks for Screening Contaminants of Potential Concern for Effects on Terrestrial Plants: 1997 Revision. Oak Ridge National Laboratory, Oak Ridge, Tennessee. pp. 128, ES/ER/ TM-85/R3.

Efroymson, R.A., M.E. Will, and G.W. Suter, II. 1997b. Toxicological Benchmarks for Contaminants of Potential Concern for Effects on Soil and Litter Invertebrates and Heterotrophic Processes: 1997 Revision. Oak Ridge National Laboratory, Oak Ridge, Tennessee. ES/ER/TM-126/R2.

Environment Canada. 2000. Priority Substances List Assessment Report – Releases of Radionuclides from Nuclear Facilities (Impact on Non-Human Biota). Draft. Health Canada. Canadian Environmental Protection Act, 1999. July.

EVS Consultants. 1998. Compilation of World-Wide Sediment Quality Guidelines for Metals and Metalloids. Final. Prepared for: Intern. Lead Zinc Res. Org., Inc., Intern. Copper Assoc., and Nickel Producers Environ. Res. Org. September.

MacDonald, D.D., C.G. Ingersoll and T.A. Berger. 2000. Development and evaluation of consensus-based sediment quality guidelines for freshwater ecosystems. Arch. Environ. Contam. Toxicol. 39: 20-31.

Shepherd Miller, Inc. (SMI). 1996. Midnite Mine Reclamation Plan, Spokane Indian Reservation Washington, Prepared for the Dawn Mining Company. June 3, 1996.

U.S. Environmental Protection Agency. 1988. Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA, Office of Emergency and Remedial Response, Washington, D.C., EPA/540/G-89/004, OSWER Directive 9355.3-01, Interim Final. October 1988.

———. 1997. Clarification of the Role of Applicable and Relevant and Appropriate Requirements in Establishing Preliminary Remediation Goals under CERCLA, Office of Solid Waste and Emergency Response, OSWER Directive No. 9200.4-23, August 22, 1997.

———. 1998a. Use of Soil Cleanup Criteria in 40 CFR 192 as Remediation Goals for CERCLA Sites. Office of Emergency and Remedial Response, Washington, DC. OSWER Directive No. 9200.4-25. EPA/540/7-97/032. NTIS PB97 -963308.

———. 1998b. Developing Risk-Based Cleanup Levels at Resource Conservation and Recovery Act Sites in Region 10. Interim Final Guidance. EPA 910/R-98-001. January.

———. 2000. Quality Assurance Project Plan for the Midnite Mine Phase 2A/1B RI/FS. Stevens County, Washington. November 30, 2000. Prepared by URS for EPA Region 10.

———. 2002. Draft Technical Memorandum. Selection of Contaminants of Potential Concern for the Human Health Risk Assessment Workplan, Midnite Mine Superfund Site. November 2002. Prepared by URS for EPA Region 10.

———. 2003. Final Contaminants of Potential Concern Screening Tables for the Human Health Risk Assessment Workplan, Midnite Mine Superfund Site. May 2003. Prepared by URS for EPA Region 10.